Volunteer Lake Assessment Program Individual Lake Reports

GARDNER, LAKE, BATH, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	141	**Max. Depth (m):**	4.7	**Flushing Rate (yr^{1})**	0.8
Surface Area (Ac.):	25	**Mean Depth (m):**	2.6	**P Retention Coef:**	0.81
Shore Length (m):	1,100	**Volume (m^3):**	256,500	**Elevation (ft):**	665

TROPHIC CLASSIFICATION

Year	Trophic class
1985	OLIGOTROPHIC

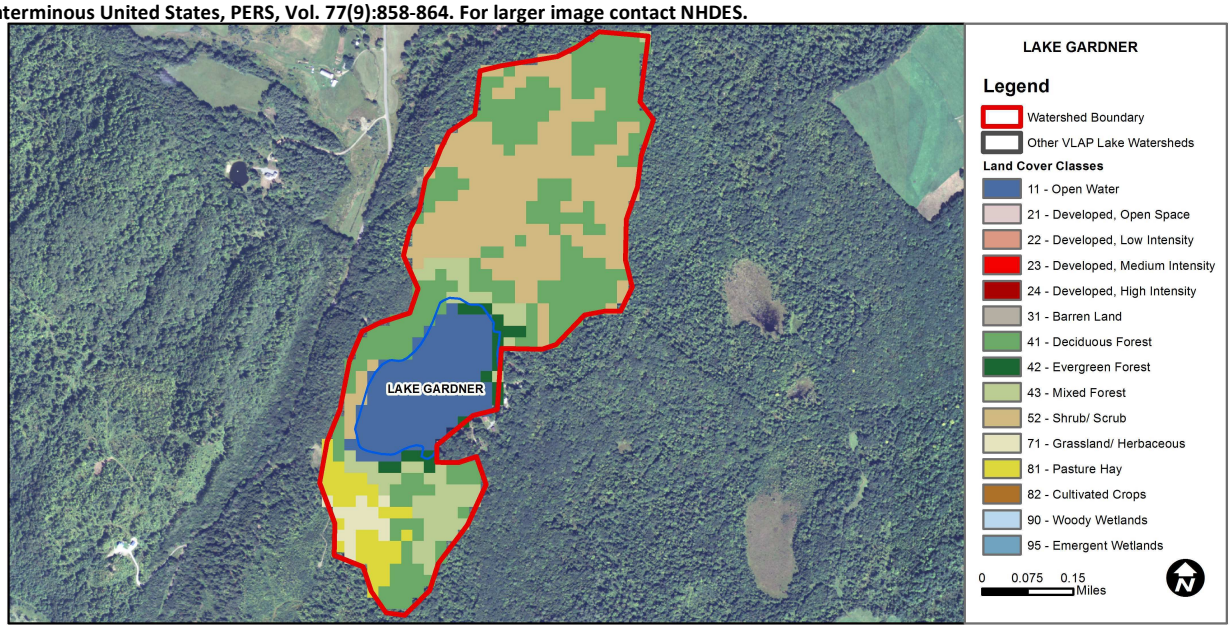
KNOWN EXOTIC SPECIES

The Waterbody Report Card tables are generated from the DRAFT 2014 305(b) report on the status of N.H. waters, and are based on data collected from 2004-2013. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organizations/divisions/water/wmb/swqa/index.htm

Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Cautionary	The calculated median is fewer than 5 samples but > indicator and the chlorophyll a indicator is okay. More data needed.
	pH	Encouraging	< 10 samples and no exceedance of criteria. More data needed.
	Oxygen, Dissolved	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Dissolved oxygen satura	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Chlorophyll-a	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator.
Primary Contact Recreation	Escherichia coli	Very Good	Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria.
	Cyanobacteria hepatoto	Slightly Bad	Cyanobacteria bloom(s).
	Chlorophyll-a	Encouraging	There are < 10 samples with 0 exceedances of indicator. More data needed.

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.



Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	15.2	Barren Land	0	Grassland/Herbaceous	2.24
Developed-Open Space	0	Deciduous Forest	35.24	Pasture Hay	5.17
Developed-Low Intensity	0	Evergreen Forest	2.8	Cultivated Crops	0
Developed-Medium Intensity	0	Mixed Forest	8.39	Woody Wetlands	0
Developed-High Intensity	0	Shrub-Scrub	31.19	Emergent Wetlands	0

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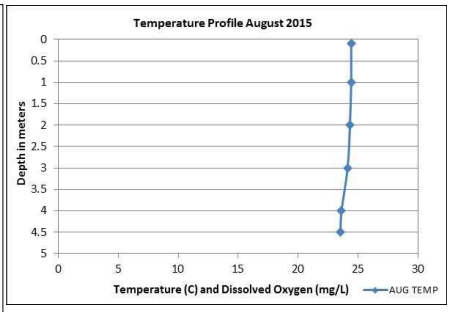
Gardner Lake, Bath

2015 Data Summary

Recommended Actions: Lake phosphorus levels and algal growth were elevated in June. Spring snowmelt and runoff after a winter of heavy snow accumulation may have transported nutrients necessary to prompt elevated levels of algal growth. A significant storm event prior to sampling may have also contributed to elevated nutrient levels. Both snowmelt and stormwater likely contributed to the high water levels in June and it is important to maintain a good flow through the Outlet to minimize negative impacts of high water levels. Chlorophyll levels have increased since 2013 and this may be due to elevated nutrients but also may be an influence of periphyton, a specific type of algae that live on stems and leaves of aquatic plants. The abundant aquatic plant growth throughout the pond combined with boat action may disturb periphyton and cause it to become suspended in the water column. Take care when collecting the chlorophyll composite not to disturb the aquatic plant growth at the deep spot. Keep up the great work!

Observations (*Refer to Table 1 and Historical Deep Spot Data Graphics*)

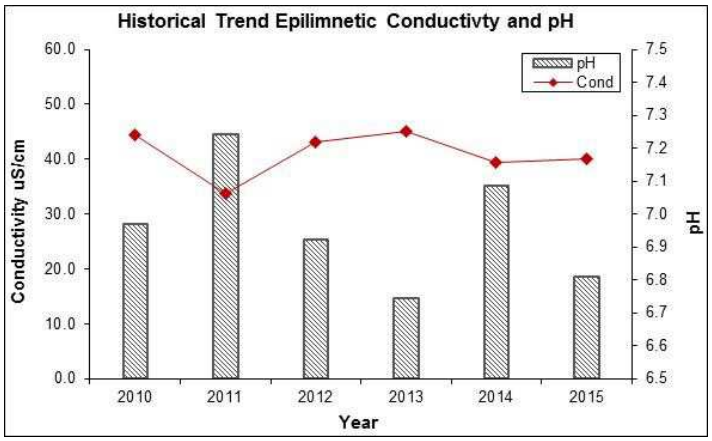
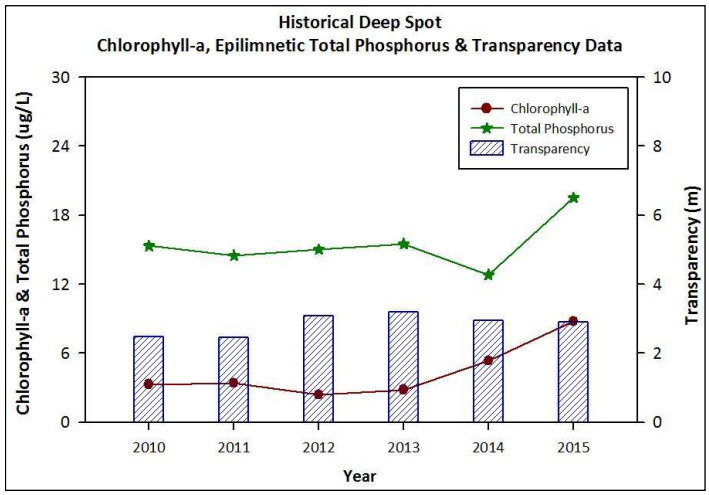
- **Chlorophyll-a:** Chlorophyll levels were elevated in June and approached levels indicative of an algal bloom. Typically, chlorophyll levels greater than 15.0 mg/m^3 indicate an algal bloom has occurred. Chlorophyll levels decreased to a more moderate level in August but were still above average for the lake. The 2015 average chlorophyll level increased from 2014 and was greater than the state median. Visual inspection of historical data indicates increasing chlorophyll levels since 2013.
- **Conductivity/Chloride:** Epilimnetic (upper water layer), Aldrich, Minot Inlet, Outlet, Ricker, Scruggs Inlet, and Vesilind Inlet conductivity levels were low and approximately equal to the state median. The Underground Spring conductivity levels were slightly elevated in June. This is likely due to any deicing materials applied to the road during the winter months and snow melt which leaches into the ground and impacts groundwater. Conductivity had decreased to average levels by the August sampling event.
- **E. coli:** Cove, Kelso and Vesilind-Minot E. coli samples resulted in no bacterial colonies present.
- **Total Phosphorus:** Epilimnetic and Outlet phosphorus levels were elevated in June when algal growth was also elevated. A significant storm event occurred prior to sampling and may have contributed to elevated phosphorus levels. Laboratory staff noted a moderate amount of sediment in the Outlet sample which likely caused the elevated phosphorus. The sediment may have been washed in through stormwater runoff or as the lake flushed after the storm event. Spring snowmelt and runoff may have contributed to the elevated epilimnetic phosphorus. Visual inspection of historical data indicates relatively stable epilimnetic phosphorus since monitoring began. Minot Inlet, Ricker, Scruggs Inlet, Underground Spring, and Vesilind Inlet phosphorus levels were within low to average ranges for those stations.
- **Transparency:** Transparency was normal for the lake and remained stable from June to August. Average transparency remained stable from 2014 and was slightly less than the state median. Visual inspection of historical data indicates relatively stable transparency since monitoring began.
- **Turbidity:** Epilimnetic turbidity was slightly elevated in June following a significant storm event and during the period of elevated algal growth. Outlet and Vesilind Inlet turbidities were also elevated in June. Lab data not sediment in the Outlet sample and Vesilind Inlet typically has a slightly higher turbidity and this may be a normal range for that station. Ricker and Scruggs Inlet turbidities were slightly elevated in August and a small amount of organic matter was noted in the Scruggs Inlet sample.
- **pH:** Epilimnetic, near shore station, and Inlet pH levels were all within the desirable range 6.5-8.0 units and sufficient to support aquatic life. Visual inspection of historical data indicates slightly variable epilimnetic pH since monitoring began.



NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: > 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: between 6.5-8.0 (unless naturally occurring)

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.
Alkalinity: 4.9 mg/L
Chlorophyll-a: 4.58 mg/m^3
Conductivity: 40.0 uS/cm
Chloride: 4 mg/L
Total Phosphorus: 12 ug/L
Transparency: 3.2 m
pH: 6.6

Station Name	Table 1. 2015 Average Water Quality Data for LAKE GARDNER								
	Alk. mg/l	Chlor-a ug/l	Cond. uS/cm	E. Coli #/100ml	Total P ug/l	Trans. m		Turb. ntu	pH
						NVS	VS		
Epilimnion	12.3	8.76	40.0		20	2.90	3.00	1.38	6.81
Aldrich			37.8		13			1.28	6.89
Cove				0					
Kelso				0					
Minot Inlet			35.6		8			0.88	6.46
Outlet			39.7		14			2.21	6.83
Ricker			37.9		14			1.45	6.94
Scruggs Inlet			48.1		10			1.73	6.66
Underground Spring			79.9		10			1.11	6.55
Vesilind Inlet			32.3		9			2.91	6.45
Vesilind-Minot				0					

Historical Water Quality Trend Analysis

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	N/A	Ten consecutive years of data necessary for analysis.	Chlorophyll-a	N/A	Ten consecutive years of data necessary for analysis.
pH (epilimnion)	N/A	Ten consecutive years of data necessary for analysis.	Transparency	N/A	Ten consecutive years of data necessary for analysis.
			Phosphorus (epilimnion)	N/A	Ten consecutive years of data necessary for analysis.